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Job No.: CTCE/BBMP/W.No.07/KRIDL/WMM/S-T/2014-15 11.07.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of Work	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	11.07.2014

Result : Flakiness Index = **12.58%**

Elongation Index = **13.47%**

Result : Combined Flakiness & Elongation index **26.05%**

Comments:

→ Maximum allowable Flakinee & Elongation Index for Wet Mix Macadam is 30%

Note:

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of Work	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
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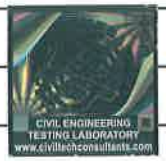

Result : Flakiness Index = **11.96%**

Elongation Index = **13.54%**

Result : Combined Flakiness & Elongation index 25.50%

Comments:

→ Maximum allowable Flakinee & Elongation Index for Wet Mix Macadam is 30%

Note:

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
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Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	11.07.2014

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.48%**

Elongation Index = **13.86%**

Result : Combined Flakiness & Elongation index 25.34%

Comments:

→ Maximum allowable Flakinee & Elongation Index for Wet Mix Macadam is 30%

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Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	11.07.2014

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **12.57%**

Elongation Index = **13.85%**

Result : Combined Flakiness & Elongation index 26.42%

Comments:

→ Maximum allowable Flakinee & Elongation Index for Wet Mix Macadam is 30%

Note:

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
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Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	11.07.2014

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.57%**

Elongation Index = **13.86%**

Result : Combined Flakiness & Elongation index 25.43%

Comments:

→ Maximum allowable Flakinee & Elongation Index for Wet Mix Macadam is 30%

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Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	11.07.2014

Result : Flakiness Index = **11.57%**

Elongation Index = **12.96%**

Result : Combined Flakiness & Elongation index **24.53%**

Comments:

→ Maximum allowable Flakinee & Elongation Index for Wet Mix Macadam is 30%

Note:

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Tele Fax : 23223227, Website : www.civiltechconsultants.com
E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com

QUALITY CONTROL REPORTS FOR

SEMI DENSE BITUMINOUS CONCRETE

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC(QB)/2014-15 06.08.2014

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

CLIENT	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	:	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	:	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
REFERENCE	:	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
SOURCE OF LOCATION	:	Hot mix Plant, Bangalore
DATE OF TESTING	:	06.08.2014

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The results of the tests conducted on the bitumen sample for Semi Dense Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	88	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	47	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	298	Min. 220

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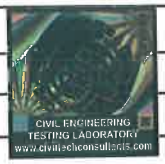
Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/AIV/2014-15 06.08.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP,
Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	06.08.2014



Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	385	387	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	87	82	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	298	305	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.60	21.19	21.89

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

Note:

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06.08.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
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Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	06.08.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	390	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	89	90	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	300	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.88	23.08	22.98

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP,
Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	06.08.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	86	84	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	296	301	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.51	21.82	22.17

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

Note:

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Aggregate Impact Value

IS: 2386 Part IV

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Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	06.08.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	383	386	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	89	88	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	294	298	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	23.24	22.80	**23.02**

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Aggregate Impact Value

IS: 2386 Part IV

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Agency	**Technical Manager,** KRIDL, Bangalore.
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Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	06.08.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	384	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	84	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	298	299	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.99	22.14	**22.06**

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
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Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 06.08.2014

Result : Flakiness Index = **11.06%**

Elongation Index = **13.10%**

Result : Combined Flakiness & Elongation index **24.16%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

Note:

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Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 06.08.2014

Result : Flakiness Index = **12.35%**

Elongation Index = **13.96%**

Result : Combined Flakiness & Elongation index **26.31%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

Note:

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Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 06.08.2014

Result : Flakiness Index = **12.56%**

Elongation Index = **13.85%**

Result : Combined Flakiness & Elongation index **26.41%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

Note:

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Shape_T/2014-15 : 06.08.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Technical Manager,** KRIDL, Bangalore.
Name of Work	: Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
Reference	: AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 06.08.2014

Result : Flakiness Index = **11.48%**

Elongation Index = **13.89%**

Result : Combined Flakiness & Elongation index **25.37%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Shape_T/2014-15 : 06.08.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Technical Manager,** KRIDL, Bangalore.
Name of Work	: Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
Reference	: AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 06.08.2014

Result : Flakiness Index = **12.65%**

Elongation Index = **13.48%**

Result : Combined Flakiness & Elongation index **26.13%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Stripping/2014-15

08.08.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the work	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	08.08.2014

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.5	3.37	96.63
2	3.2		
3	3.4		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Sp_Wa/2014-15

08.08.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	08.08.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2024	2022	2025	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1269	1267	1270	
4	Weight of saturated surface dry aggregate in air	W_3 g	2029	2028	2030	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	760	761	760	
6	Weight of oven dried aggregate	W_4 g	2015	2014	2017	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.651	2.647	2.654	2.651
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.701	2.696	2.700	2.699
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.69%	0.70%	0.64%	0.68%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Bit/2014-15 08.08.2014

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CLIENT	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
REFERENCE	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
SAMPLE I/D	Cross roads in UAS Layout Jakkur Ward No.07
DATE OF TESTING	08.08.2014

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	474.5	474.5
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25.5	25.50
7. Bitumen content in %	5.10	5.10
8. Average	**5.10**	

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Bit/2014-15 08.08.2014

BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
REFERENCE	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
SAMPLE I/D	Cross roads in UAS Layout Jakkur Ward No.07
DATE OF TESTING	08.08.2014

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-4 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	25.32	5.34	5.34	94.66	90-100
4.75	258.4	54.46	59.79	40.21	35-51
2.36	65.22	13.74	73.54	26.46	24-39
1.18	43.15	9.09	82.63	17.37	15-30
0.3	26.87	5.66	88.30	11.70	9-19
0.075	25.12	5.29	93.59	6.41	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-4 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	32.63	6.88	6.88	93.12	90-100
4.75	254.7	53.68	60.55	39.45	35-51
2.36	53.26	11.22	71.78	28.22	24-39
1.18	35.48	7.48	79.26	20.74	15-30
0.3	36.23	7.64	86.89	13.11	9-19
0.075	31.27	6.59	93.48	6.52	3-8

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/AGG/2014-15 08.08.2014

Aggregate Gradation Test

IS : 2386 Part I

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements of Roads and Drains in UAS 1st cross to 4th cross in Jakkur Ward No.07 of Byatarayanapura Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/(KOD.SUB.DIV)/29/2014-15 Dated: 07.07.2014
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	08.08.2014

Total Weight of Sample: **5350** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	345	6.4	6.45	93.55	90-100	
4.75	2595	48.5	54.95	45.05	35-51	
2.36	650	12.1	67.10	32.90	24-39	
1.18	455	8.5	75.61	24.39	15-30	
0.3	425	7.9	83.55	16.45	9-19	
0.075	465	8.7	92.24	7.76	3-8	

Total Weight of Sample: **5400** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	250	4.6	4.63	95.37	90-100	
4.75	2615	48.4	53.06	46.94	35-51	
2.36	845	15.6	68.70	31.30	24-39	
1.18	530	9.8	78.52	21.48	15-30	
0.3	450	8.3	86.85	13.15	9-19	
0.075	460	8.5	95.37	4.63	3-8	

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